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index of refraction material to the total thickness of all of the layers of low index of refraction material, r , is at least 0.91, and the total number of said layers is at least 78.

REMARKS

Applicant's counsel thanks the Examiner for a very thorough and careful examination of the present application. Claim 19 has been amended to correct a clerical error. No new matter is entered.

Presently, claims 12-16, 19 and 20 are allowed. Claim 1 and the dependencies therefrom are rejected by the Examiner. These rejections are addressed below.

Claim 1 is rejected under Section 103 as being allegedly obvious over Krisl et al. (US 5,138,219). The Examiner's position is that Krisl et al. disclose an optical interference filter having 51 total layers of alternating high and low index of refraction materials, and that "it would have been obvious to one of ordinary skill in the art...to add one or more layers and thus having total number of layers greater than 51." See Office action, page 2. The Examiner has also rejected claims 9 and 10 which respectively recite greater than 70 and 78 total layers. With respect to claim 9, the Examiner's reasoning is that "it would have been obvious...to add more numbers of layers [over the 51 disclosed by Krisl et al.], since mere duplication of essential parts of the invention is considered within the skill of the art. In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)." Office action, page 4. The rejection of claim 10 is based on the Examiner's position that "[i]t would have been obvious...to provide the total number of layers equal to 78...since optimization of workable ranges is considered within the skill of the art. In re Aller, 105 USPQ 233." Office action, page 4.

The above rejections of claims 1, 9 and 10 are

respectfully traversed. In rejecting claim 1, the Examiner has stated that it would have been obvious to add additional refractive layers to the 51 layers disclosed in Krisl et al., but has failed to provide any motivation, contained in the reference or otherwise, for doing so. In addition, this position of the Examiner ignores the fact that, prior to the invention, the addition of such additional refractive layers would have induced mechanical failure due to excessive tensile stress in the coating. The practical limit for the number of layers that can be added to the coating has historically been 46, above which the coatings would spall off the substrates due to increased stress. (See specification, page 2 lines 7-14). The Krisl patent discloses a coating structure having 5 additional layers, bringing the total to 51, but it is entirely silent regarding application of additional layers in a manner that overcomes the problem of failure due to increased stress.

The inventors herein devised a way to provide additional refractive layers in an optical interference coating (greater than 51 layers as recited in claim 1) in such a manner that the additional layers do not result in excess stress and mechanical failure which had been the problem in the conventional art.

The invention of claim 1 comprises an interference coating comprising alternating layers of high index of refraction and low index of refraction materials. The ratio of total thickness between the high- and low-index of refraction materials is more strongly determinative of mechanical stress than of optical performance. (See specification, page 5 lines 13-15). Recognizing this relationship, the inventors surprisingly found that "as the value of r [thickness ratio of high- to low-index of refraction materials] is increased for a given number of layers, the mechanical stresses decrease. As a result, for the first time, more than 51 layers can be used in the

interference coating without suffering mechanical failure due to tensile stresses." (See specification, page 5 lines 18-23).

Krisl et al. neither a) recognize the inherent difficulties associated with increased mechanical stress from providing greater than 51 layers of refractive materials in the interference coating, or b) provide any motivation for increasing the number of layers. Contrary to the Examiner's position, it would not have been obvious simply to add more layers because, as explained above, such would have traditionally resulted in over-stressing the layers causing mechanical failure of the coating. Krisl et al. neither recognize nor address this problem. Only by appropriately regulating the ratio of high- to low-index of refraction materials can additional layers over 51 be provided reliably and consistently without mechanical failure to an optical interference coating as explained in the specification (see page 5 lines 26-31).

In view of the above, the rejection of claim 1 has been overcome, and it is believed that claim 1 is now allowable.

Claim 9 depends from claim 1, adding the limitation that the total number of layers is greater than 70. In rejecting this claim, the Examiner has relied on *In re Harza* to support the proposition that "mere duplication of essential parts of the invention is considered within the skill in the art." In that case, the CCPA sustained a rejection of a claim that merely added "a plurality of ribs on each side of [a water stop web] [when the cited reference] shows only a single rib on each side.... It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced...." *In re Harza*, 274 F.2d 669, 774 (CCPA 1960).

The applicant in *Harza* was merely adding additional ribs to a water stop where there was no expectation that the additional ribs would cause the water stop to mechanically

fail or become nonfunctional. Conversely, prior to the present invention, additional high- and low-index of refraction materials would result in mechanical failure. In recognizing the relationship between the ratio of refractive material thickness, mechanical stress and optical performance, the inventors herein devised a way to provide additional layers without causing mechanical failure.

The Examiner's reliance on *In re Aller* to reject claim 10 (reciting 78 refractive layers) is also misplaced. In *Aller*, the CCPA held that the applicants' invention therein was not different in kind from what was disclosed in the references, but only in degree. Thus, *In re Aller* stands for the proposition that when a claimed invention differs in degree from a prior-art product or method, it is within the ability of a person of ordinary skill in the art to do routine experimentation to discover the optimum workable ranges for known process or product variables in order to achieve the improved degree of performance.

The 78 layers recited in claim 10 produce an optical interference coating that is different in kind from that disclosed in *Krisl et al.*; the invented coating is not overstressed by the additional layers and is mechanically stable. This is very different from the situation in *Aller*, where skilled persons could expect that routine experimentation would produce the desired result, which was an improvement in product yield for a chemical reaction (an improvement in degree). Conversely, in the present application, skilled persons would not expect to be able to produce an improved interference coating by simply adding more layers greater than 51 because the mere addition of these layers would have resulted in mechanical failure.

Prior to the present invention, additional layers would (or were expected to) result in failure of the coating due to excessive coating stress. *Krisl et al.* nowhere suggests or even recognize that the stress resulting from additional

layers could be reduced below the mechanical failure threshold by controlling the ratio of the overall thicknesses of the high- to low-index of refraction material layers. Neither do Krisl et al. provide any motivation to increase the number of refractive layers above 51, or to regulate the above ratio to make additional layers possible without inducing mechanical failure.

Accordingly, the rejections of claims 9 and 10 are now overcome, and are believed to be allowable.

Claims 12-16, 19 and 20 are allowed. Further, the rejections of claims 1, 9 and 10 have now been overcome and should be allowable. All remaining claims are dependent claims and should therefore also be allowable. It is now believed that all claims are in condition for allowance and notice to that effect is respectfully requested.

It is noted that on August 22, 2002, Applicant filed an information disclosure statement listing a reference for the Examiner's consideration. Applicant has not yet received the initialed copy of the 1449 submitted with that information disclosure statement. Therefore, Applicant respectfully requests the Examiner initial and enclose the 1449 with her next communication to the Applicant.

If there are any fees required by this communication, please charge such fees to our Deposit Account No. 16-1820, Order No. 32575.

Respectfully submitted,

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19. (amended) An electric lamp as in claim 12, ~~optical interference coating according to claim 1~~, wherein a ratio of the total thickness of all of the layers of high index of refraction material to the total thickness of all of the layers of low index of refraction material, r , is at least 0.91, and the total number of said layers is at least 78.